DRINKING WATER SURVEILLANCE PROGRAM

MITCHELL'S BAY WATER TREATMENT PLANT

ANNUAL REPORT 1990

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MITCHELL'S BAY
WATER TREATMENT PLANT

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

MITCHELL'S BAY WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Mitchell's Bay water treatment plant is a package plant using conventional treatment and treats water from Lake St. Clair. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a rated capacity of 0.54 x 1000 m^3/day. The Mitchell's Bay water treatment plant serves a population of approximately 400.

Raw and treated water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Mitchell's Bay water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM MITCHELL'S BAY WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE

A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE
	BACTERIOLOGICAL	15	12	80	4	1	25
	CHEMISTRY (FLD)	18	18	100	34	34	100
	CHEMISTRY (LAB)	131	120	91	130	93	71
	METALS	144	69	47	144	62	43
	CHLOROAROMATICS	84	0	0	84	0	0
	CHLOROPHENOLS	6	0	0	12	0	0
	PAH	102	0	0	68	0	0
	PESTICIDES & PCB	206	1	0	206	0	0
	PHENOLICS	6	0	0	6	0	0
	SPECIFIC PESTICIDES	43	0	0	56	0	0
	VOLATILES	174	1	0	174	24	13
TOTAL		929	221		918	214	

DRINKING WATER SURVEILLANCE PROGRAM

MITCHELL'S BAY WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Mitchell's Bay water treatment plant in spring of 1985 as part of a study on the St. Clair/Detroit River area. Previous DWSP annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Mitchell's Bay water treatment plant is a package plant which uses conventional treatment and treats water from Lake St. Clair. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a rated capacity of 0.54 x 1000 m^3/day. The Mitchell's Bay water treatment plant serves a population of approximately 400.

The sample day flows ranged from 0.06 x 1000 m^3/day to 0.15 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

At Mitchell's Bay there were no distribution samples taken. Raw and treated water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be

confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FLD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may

increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 3 of 6 treated water samples with a maximum recorded value of 21.1°C.

CHEMISTRY (LAB)

Alkalinity was below the ODWO Aesthetic or Recommended Operational Guideline of 30-500 mg/L in 1 of 6 treated water samples with a recorded value of 25.7 mg/L.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 1 of 6 treated water samples with a maximum recorded value of 23.5 HZU.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in 4 of 6 treated water samples with a maximum recorded value of 464.0 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 5 of 6 treated water samples with a maximum recorded value of 209.4 mg/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results detected above trace levels.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 6 treated water samples analyzed with a maximum level of 50.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Mitchell's Bay water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

MITCHELL'S BAY WATER TREATMENT PLANT

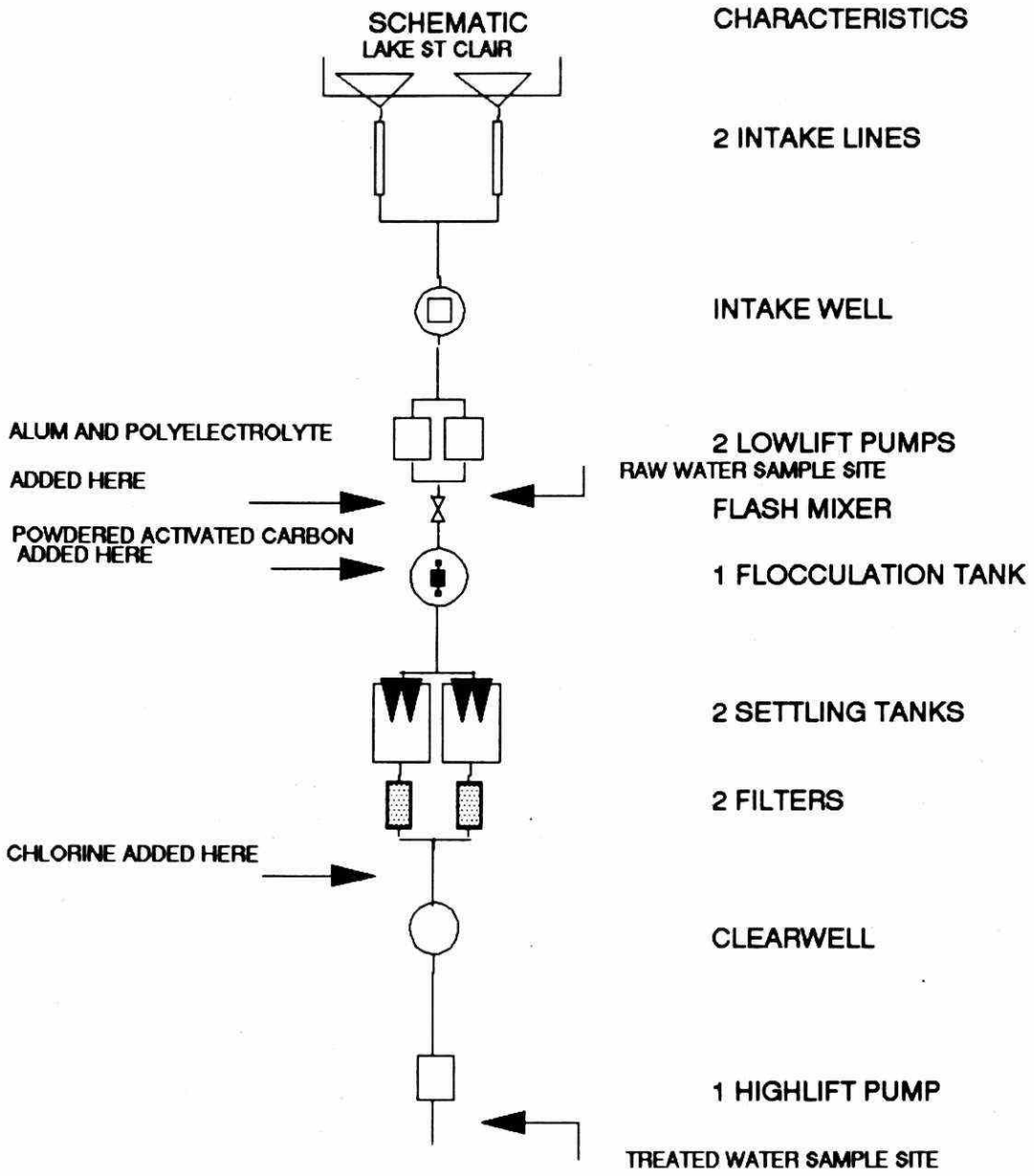

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003234
PLANT NAME: MITCHELLS BAY WTP

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :O. WIGLE

UTM #: 173839504702600

PLANT SUPERINTENDENT: R.D. HEMBER (BOB)

ADDRESS: MITCHELLS BAY WTP
C/O MIN. OF ENVIRONMENT
P.O. BOX 250
WALLACEBURG, ONT.
N8A 4L6

PLANT (519-351-3838)
OFFICE (519-627-1211)

MUNICIPALITY: MITCHELLS BAY
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	.321	(X 1000 M3)
DESIGN CAPACITY:	1.091	(X 1000 M3/DAY)
RATED CAPACITY:	0.540	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
MITCHELLS BAY	350

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
COMBINED CHLORINE RESIDUAL	TREATED WATER	DAILY READING
FREE CHLORINE RESIDUAL	TREATED WATER	DAILY READING
TOTAL CHLORINE RESIDUAL	TREATED WATER	DAILY READING
TEMPERATURE	RAW WATER	DAILY READING
	TREATED WATER	DAILY READING
TURBIDITY	AFTER FILTERS	DAILY READING
	RAW WATER	DAILY READING
	AFTER SETTLING TANKS	DAILY READING
	TREATED WATER	DAILY READING

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)			
			COAGULATION	COAGULATION AID	TASTE & ODOUR	POST CHLORINATION
			ALUM LIQUID	POLYELECTROLYTE	ACTIVATED CARBON POW	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)				
APR 17	4.00	.066	50.67	1.20	7.10	1.50
JUN 20	6.75	.157	78.00	.45	3.90	.80
AUG 20	4.25	.090	8.13	.45	3.64	1.80
OCT 17	4.50	.092	78.00	.43	3.00	
DEC 17	.00	.000	78.00	.44	3.00	.90

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL						
FECAL COLIFORM MF	5	4	0	.	.	.
STANDRD PLATE CNT MF	.	.	.	4	1	0
TOTAL COLIFORM MF	5	3	0	.	.	.
T COLIFORM BCKGRD MF	5	5	0	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	15	12	0	4	1	0
CHEMISTRY (FLD)						
FLD CHLORINE (COMB)	.	.	.	5	5	0
FLD CHLORINE FREE	.	.	.	5	5	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0
FLD PH	6	6	0	6	6	0
FLD TEMPERATURE	6	6	0	6	6	0
FLD TURBIDITY	6	6	0	6	6	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	34	34	0
CHEMISTRY (LAB)						
ALKALINITY	6	6	0	6	6	0
CALCIUM	6	6	0	6	6	0
CYANIDE	6	0	0	6	0	0
CHLORIDE	6	6	0	6	6	0
COLOUR	6	5	1	6	2	4
CONDUCTIVITY	6	6	0	6	6	0
DISS ORG CARBON	6	6	0	6	6	0
FLUORIDE	6	6	0	6	5	1
HARDNESS	6	6	0	6	6	0
IONCAL	6	6	0	6	6	0
LANGELIERS INDEX	5	5	0	4	4	0
MAGNESIUM	6	6	0	6	6	0
SODIUM	6	6	0	6	6	0
AMMONIUM TOTAL	6	3	0	6	0	3
NITRITE	6	5	1	6	0	5
TOTAL NITRATES	6	6	0	6	6	0
NITROGEN TOT KJELD	6	6	0	6	5	1
PH	6	6	0	6	6	0
PHOSPHORUS FIL REACT	6	6	0	6	0	5
PHOSPHORUS TOTAL	6	6	0	6	0	4
SULPHATE	6	6	0	6	6	0
TURBIDITY	6	6	0	6	5	1
*TOTAL SCAN CHEMISTRY (LAB)	131	120	2	130	93	24

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS						
SILVER	6	0	0	6	0	1
ALUMINUM	6	6	0	6	6	0
ARSENIC	6	2	4	6	0	5
BARIUM	6	6	0	6	6	0
BORON	6	5	1	6	4	2
BERYLLIUM	6	0	2	6	0	1
CADMIUM	6	0	3	6	0	0
COBALT	6	0	6	6	0	6
CHROMIUM	6	0	5	6	0	4
COPPER	6	1	5	6	6	0
IRON	6	4	2	6	2	4
MERCURY	6	0	2	6	1	0
MANGANESE	6	6	0	6	6	0
MOLYBDENUM	6	5	1	6	6	0
NICKEL	6	0	3	6	0	4
LEAD	6	3	3	6	4	2
ANTIMONY	6	2	4	6	1	5
SELENIUM	6	0	0	6	0	3
STRONTIUM	6	6	0	6	6	0
TITANIUM	6	6	0	6	3	3
THALLIUM	6	0	0	6	0	0
URANIUM	6	5	1	6	0	4
VANADIUM	6	6	0	6	5	1
ZINC	6	6	0	6	6	0
*TOTAL SCAN METALS	144	69	42	144	62	45
*TOTAL GROUP INORGANIC & PHYSICAL	293	207	44	308	189	69
CHLOROAROMATICS						
HEXACHLOROBUTADIENE	6	0	0	6	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0
HCB	6	0	0	6	0	0
HEXACHLOROETHANE	6	0	0	6	0	0
OCTACHLOROSTYRENE	6	0	0	6	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	0
CHLOROPHENOLS						

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	1	0	0	2	0	0
2345 T-CHLOROPHENOL	1	0	0	2	0	0
2356 T-CHLOROPHENOL	1	0	0	2	0	0
245-TRICHLOROPHENOL	1	0	0	2	0	0
246-TRICHLOROPHENOL	1	0	0	2	0	0
PENTACHLOROPHENOL	1	0	0	2	0	0
*TOTAL SCAN CHLOROPHENOLS	6	0	0	12	0	0
PAH						
PHENANTHRENE	6	0	0	4	0	0
ANTHRACENE	6	0	0	4	0	0
FLUORANTHENE	6	0	0	4	0	0
PYRENE	6	0	0	4	0	0
BENZO(A)ANTHRACENE	6	0	0	4	0	0
CHRYSENE	6	0	0	4	0	0
DIMETH. BENZ(A)ANTHR	6	0	0	4	0	0
BENZO(E) PYRENE	6	0	0	4	0	0
BENZO(B) FLUORANTHEN	6	0	0	4	0	0
PERYLENE	6	0	0	4	0	0
BENZO(K) FLUORANTHEN	6	0	0	4	0	0
BENZO(A) PYRENE	6	0	0	4	0	0
BENZO(G,H,I) PERYLEN	6	0	0	4	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	4	0	0
INDENO(1,2,3-C,D) PY	6	0	0	4	0	0
BENZO(B) CHRYSENE	6	0	0	4	0	0
CORONENE	6	0	0	4	0	0
*TOTAL SCAN PAH	102	0	0	68	0	0
PESTICIDES & PCB						
ALDRIN	6	0	0	6	0	0
ALPHA BHC	6	0	1	6	0	1
BETA BHC	6	0	0	6	0	0
LINDANE	6	0	0	6	0	0
ALPHA CHLORDANE	6	0	0	6	0	0
GAMMA CHLORDANE	6	0	0	6	0	0
DIELDRIN	6	0	0	6	0	0
METHOXYCHLOR	6	0	0	6	0	0
ENDOSULFAN 1	6	0	0	6	0	0
ENDOSULFAN II	6	0	0	6	0	0
ENDRIN	6	0	0	6	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0
HEPTACHLOR	6	0	0	6	0	0
MIREX	6	0	0	6	0	0
OXYCHLORDANE	6	0	0	6	0	0
OPDDT	6	0	0	6	0	0
PCB	6	0	0	6	0	0
DDD	6	0	0	6	0	0
PPDDE	6	0	0	6	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	6	0	0	6	0	0
AMETRINE	6	0	0	6	0	0
ATRAZINE	6	1	4	6	0	3
ATRATONE	6	0	0	6	0	0
CYANAZINE (BLADEX)	6	0	0	6	0	0
DESETHYLATRAZINE	6	0	0	6	0	0
D-ETHYL SIMAZINE	6	0	0	6	0	0
PROMETONE	6	0	0	6	0	0
PROPAZINE	6	0	0	6	0	0
PROMETRYNE	6	0	0	6	0	0
METRIBUZIN (SENCOR)	6	0	1	6	0	0
SIMAZINE	6	0	0	6	0	0
ALACHLOR (LASSO)	6	0	0	6	0	0
METOLACHLOR	6	0	1	6	0	0
HEXACLCYCLOPENTADIEN	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	206	1	7	206	0	4
PHENOLICS						
PHENOLICS	6	0	5	6	0	2
*TOTAL SCAN PHENOLICS	6	0	5	6	0	2
SPECIFIC PESTICIDES						
TOXAPHENE	6	0	0	6	0	0
2,4,5-T	1	0	0	2	0	0
2,4-D	1	0	0	2	0	0
2,4-DB	1	0	0	2	0	0
2,4 D PROPIONIC ACID	1	0	0	2	0	0
DICAMBA	1	0	0	1	0	0
PICHLORAM	0	0	0	0	0	0
SILVEX	1	0	0	2	0	0
DIAZINON	2	0	0	2	0	0
DICHLOROVOS	2	0	0	2	0	0
CHLORPYRIFOS	2	0	0	2	0	0
ETHION	2	0	0	2	0	0
AZINPHOS-METHYL	0	0	0	0	0	0
MALATHION	2	0	0	2	0	0
MEVINPHOS	2	0	0	2	0	0
METHYL PARATHION	2	0	0	2	0	0
METHYLTRITHION	2	0	0	2	0	0
PARATHION	2	0	0	2	0	0
PHORATE	1	0	0	1	0	0
RELDAN	2	0	0	2	0	0
RONNEL	2	0	0	2	0	0
AMINOCARB	0	0	0	0	0	0
BENONYL	0	0	0	0	0	0
BUX	0	0	0	0	0	0
CARBOFURAN	1	0	0	2	0	0
CICP	1	0	0	2	0	0
DIALLATE	1	0	0	2	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	2	0	0
IPC	1	0	0	2	0	0
PROPOXUR	1	0	0	2	0	0
CARBARYL	1	0	0	2	0	0
BUTYLATE	1	0	0	2	0	0
*TOTAL SCAN SPECIFIC PESTICIDES	43	0	0	56	0	0
VOLATILES						
BENZENE	6	0	0	6	0	1
TOLUENE	6	0	0	6	0	2
ETHYLBENZENE	6	0	1	6	0	4
P-XYLENE	6	0	0	6	0	0
M-XYLENE	6	0	0	6	0	0
O-XYLENE	6	0	0	6	0	1
STYRENE	6	0	1	6	0	0
1,1 DICHLOROETHYLENE	6	0	0	6	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0
CHLOROFORM	6	0	0	6	6	0
111, TRICHLOROETHANE	6	1	0	6	0	2
1,2 DICHLOROETHANE	6	0	0	6	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	0
1,2 DICHLOROPROPANE	6	0	0	6	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0
DICHLOROBROMOMETHANE	6	0	0	6	6	0
112 TRICHLOROETHANE	6	0	0	6	0	0
CHLORODIBROMOMETHANE	6	0	0	6	6	0
T-CHLOROETHYLENE	6	0	0	6	0	0
BROMOFORM	6	0	0	6	0	6
1122 T-CHLOROETHANE	6	0	0	6	0	0
CHLOROBENZENE	6	0	0	6	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0
*TOTAL SCAN VOLATILES	174	1	2	174	24	16
*TOTAL GROUP ORGANIC	621	2	14	606	24	22

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)
FEB	16	.		
APR	4	.		
AUG	BDL	.		
OCT	2	.		
DEC	10	.		
STANDRD PLATE CNT MF (COUNTS/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)
FEB	.	0 <=>		
APR	.	1 <=>		
OCT	.	36		
DEC	.	1 <=>		
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)
FEB	5200	.		
APR	600	.		
AUG	BDL	.		
OCT	10 <=>	.		
DEC	180	.		
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A
FEB	71000	.		
APR	7000	.		
AUG	16000	.		
OCT	13000	.		
DEC	8900	.		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
CHEMISTRY (FLD)			
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A
FEB	.	.600	
APR	.	.200	
JUN	.	.200	
AUG	.	.800	
OCT	.	.200	
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A
FEB	.	.800	
APR	.	.400	
JUN	.	.600	
AUG	.	1.000	
OCT	.	.300	
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A
FEB	.	1.400	
APR	.	.600	
JUN	.	.800	
AUG	.	1.800	
OCT	.	.500	
DEC	.	.900	
FLD PH (DMNSLESS)		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
FEB	7.400	6.700	
APR	6.900	6.600	
JUN	6.600	6.820	
AUG	8.000	6.800	
OCT	6.600	6.800	
DEC	7.200	6.800	
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
FEB	9.400	13.500	
APR	8.600	12.700	
JUN	21.800	21.100	
AUG	21.000	21.000	
OCT	19.000	18.900	
DEC	11.000	12.000	
FLD TURBIDITY (FTU)		DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
FEB	55.000	.250	
APR	23.000	.120	
JUN	13.500	.110	
AUG	2.200	.140	
OCT	11.100	.150	
DEC	17.000	.600	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)
FEB	119.800	85.200		
APR	139.300	101.900		
JUN	105.900	61.900		
AUG	67.800	25.700		
OCT	171.900	101.300		
DEC	126.300	92.500		
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
FEB	52.900	55.700		
APR	63.500	61.600		
JUN	39.000	39.600		
AUG	22.400	22.600		
OCT	76.300	60.300		
DEC	51.800	54.600		
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
FEB	22.000	25.400		
APR	26.600	26.200		
JUN	15.300	17.300		
AUG	11.200	13.000		
OCT	28.900	25.300		
DEC	18.000	21.000		
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
FEB	.500 <T	1.500 <T		
APR	9.000	2.000 <T		
JUN	6.000	1.000 <T		
AUG	5.500	1.000 <T		
OCT	22.500	3.000		
DEC	7.500	23.500		
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
FEB	400	439		
APR	472	464		
JUN	312	329		
AUG	207	228		
OCT	529	455		
DEC	377	404		
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)
FEB	3.100	1.800		
APR	3.800	2.300		
JUN	3.000	1.400		
AUG	2.900	1.000		
OCT	5.500	1.600		
DEC	2.800	1.600		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
FLUORIDE (MG/L)			DET'N LIMIT = 0.01 GUIDELINE = 2.4 (A1)
FEB	.120	.060	
APR	.120	.060	
JUN	.100	.060	
AUG	.100	.040 <T	
OCT	.140	.060	
DEC	.100	.060	
HARDNESS (MG/L)			DET'N LIMIT = 0.5 GUIDELINE = 80-100 (A4)
FEB	180.700	189.600	
APR	215.000	209.400	
JUN	141.000	143.000	
AUG	91.000	92.000	
OCT	254.000	206.600	
DEC	177.000	185.000	
IONCAL (DMNSLESS)			DET'N LIMIT = N/A GUIDELINE = N/A
FEB	3.325	1.487	
APR	.070	.388	
JUN	.055	.037	
AUG	3.296	1.633	
OCT	2.408	.010	
DEC	1.293	.246	
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A GUIDELINE = N/A
FEB	.671	.231	
APR	.759	.370	
JUN	.343	-.255	
AUG	-.041	-.987	
OCT	1.034	.439	
DEC	.647	.382	
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1 GUIDELINE = 30 (F2)
FEB	11.800	12.300	
APR	13.700	13.500	
JUN	10.700	10.700	
AUG	8.600	8.600	
OCT	15.500	13.600	
DEC	11.600	11.900	
SODIUM (MG/L)			DET'N LIMIT = 0.2 GUIDELINE = 200 (A4)
FEB	6.800	9.200	
APR	10.700	10.400	
JUN	7.500	7.400	
AUG	6.600	6.600	
OCT	12.300	9.700	
DEC	8.400	7.800	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)
FEB	.018	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	.020	.004 <T		
OCT	.012	.002 <T		
DEC	BDL	.004 <T		
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)
FEB	.038	BDL		
APR	.021	.001 <T		
JUN	.038	.002 <T		
AUG	.003 <T	.002 <T		
OCT	.029	.001 <T		
DEC	.012	.001 <T		
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)
FEB	4.680	4.500		
APR	4.150	4.110		
JUN	1.050	.990		
AUG	.060	.055		
OCT	3.900	2.680		
DEC	2.510	2.740		
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
FEB	.670	.340		
APR	.980	.310		
JUN	.310	.160		
AUG	.290	.080 <T		
OCT	.690	.310		
DEC	.440	.290		
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
FEB	8.320	8.010		
APR	8.270	8.030		
JUN	8.170	7.800		
AUG	8.180	7.660		
OCT	8.380	8.110		
DEC	8.280	8.130		
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A
FEB	.036	.000 <T		
APR	.012	.000 <T		
JUN	.009	BDL		
AUG	.010	.002 <T		
OCT	.002	.000 <T		
DEC	.007	.000 <T		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT			DISTRIBUTION SYSTEM
	RAW	TREATED		
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)
FEB	.075	.007	<T	
APR	.040	.003	<T	
JUN	.020	BDL		
AUG	.018	BDL		
OCT	.025	.004	<T	
DEC	.028	.003	<T	
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)
FEB	33.000	72.660		
APR	44.480	74.420		
JUN	25.310	66.330		
AUG	17.770	57.830		
OCT	45.900	77.770		
DEC	30.850	67.990		
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)
FEB	58.000	.450		
APR	21.000	.710		
JUN	1.500	.250	<T	
AUG	1.200	.270		
OCT	8.000	.290		
DEC	17.900	.730		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
METALS				
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)
FEB	BDL	.060 <T		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	BDL		
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
FEB	450.000	29.000		
APR	250.000	20.000		
JUN	75.000	16.000		
AUG	59.000	25.000		
OCT	220.000	21.000		
DEC	170.000	26.000		
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
FEB	1.000 <T	.330 <T		
APR	.270 <T	BDL		
JUN	.910 <T	.400 <T		
AUG	1.800	.390 <T		
OCT	1.100	.380 <T		
DEC	.480 <T	.120 <T		
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
FEB	24.000	21.000		
APR	27.000	23.000		
JUN	19.000	19.000		
AUG	12.000	18.000		
OCT	36.000	26.000		
DEC	21.000	20.000		
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
FEB	39.000	20.000 <T		
APR	27.000	41.000		
JUN	33.000	33.000		
AUG	33.000	40.000		
OCT	47.000	36.000		
DEC	19.000 <T	20.000 <T		
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)
FEB	.090 <T	BDL		
APR	.060 <T	.060 <T		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
FEB	.150 <T	BDL		
APR	.070 <T	BDL		
JUN	BDL	BDL		
AUG	.060 <T	BDL		
OCT	BDL	BDL		
DEC	BDL	BDL		
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
FEB	.430 <T	.090 <T		
APR	.360 <T	.160 <T		
JUN	.110 <T	.150 <T		
AUG	.090 <T	.140 <T		
OCT	.300 <T	.190 <T		
DEC	.230 <T	.150 <T		
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
FEB	3.900 <T	BDL		
APR	.520 <T	1.900 <T		
JUN	3.300 <T	2.300 <T		
AUG	1.700 <T	1.000 <T		
OCT	2.000 <T	1.100 <T		
DEC	BDL	BDL		
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)
FEB	11.000	15.000		
APR	2.200 <T	12.000		
JUN	2.200 <T	17.000		
AUG	1.600 <T	28.000		
OCT	2.700 <T	29.000		
DEC	1.700 <T	20.000		
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
FEB	560.000	39.000 <T		
APR	310.000	46.000 <T		
JUN	32.000 <T	45.000 <T		
AUG	41.000 <T	53.000 <T		
OCT	220.000	71.000		
DEC	250.000	84.000		
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)
FEB	.030 <T	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	.100 <T	.190		
DEC	BDL	BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)
FEB	17.000	5.100		
APR	9.600	4.900		
JUN	8.300	7.300		
AUG	4.800	6.700		
OCT	8.400	4.800		
DEC	5.300	6.700		
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
FEB	.420 <T	1.100		
APR	1.000	1.400		
JUN	1.300	1.000		
AUG	.980	.750		
OCT	2.000	1.600		
DEC	.570	.870		
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)
FEB	BDL	.250 <T		
APR	2.000 <T	1.500 <T		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	.850 <T	.720 <T		
DEC	.920 <T	.670 <T		
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)
FEB	1.400	.710		
APR	.890	.450 <T		
JUN	.350 <T	.480 <T		
AUG	.310 <T	.730		
OCT	.410 <T	.730		
DEC	.530	.720		
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)
FEB	.360 <T	.350 <T		
APR	.270 <T	.380 <T		
JUN	.520	.400 <T		
AUG	.390 <T	.560		
OCT	.510	.310 <T		
DEC	.430 <T	.400 <T		
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)
FEB	BDL	2.400 <T		
APR	BDL	1.300 <T		
JUN	BDL	BDL		
AUG	BDL	1.700 <T		
OCT	BDL	BDL		
DEC	BDL	BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
STRONTIUM (UG/L)			DET'N LIMIT = 0.10 GUIDELINE = N/A
FEB	150.000	160.000	
APR	190.000	180.000	
JUN	140.000	140.000	
AUG	120.000	130.000	
OCT	220.000	180.000	
DEC	140.000	150.000	
TITANIUM (UG/L)			DET'N LIMIT = 0.50 GUIDELINE = N/A
FEB	9.500	8.500	
APR	9.300	6.800	
JUN	7.300	5.600	
AUG	5.500	3.300 <T	
OCT	11.000	4.200 <T	
DEC	5.300	4.300 <T	
URANIUM (UG/L)			DET'N LIMIT = 0.05 GUIDELINE = 100 (A1)
FEB	.970	.160 <T	
APR	1.300	.260 <T	
JUN	.610	BDL	
AUG	.340 <T	BDL	
OCT	1.800	.080 <T	
DEC	.800	.100 <T	
VANADIUM (UG/L)			DET'N LIMIT = 0.05 GUIDELINE = N/A
FEB	1.500	.590	
APR	.780	.510	
JUN	.720	.620	
AUG	1.100	.470 <T	
OCT	.870	.610	
DEC	.630	.690	
ZINC (UG/L)			DET'N LIMIT = 0.20 GUIDELINE = 5000 (A3)
FEB	14.000	6.900	
APR	8.000	5.500	
JUN	5.100	6.200	
AUG	3.700	8.000	
OCT	5.400	8.100	
DEC	5.300	8.000	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	1.000 <T	2.000 <T		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	BDL		
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
FEB	370.000 <T	330.000 <T		
APR	120.000 <T	140.000 <T		
JUN	220.000 <T	BDL		
AUG	BDL	BDL		
OCT	680.000	450.000 <T		
DEC	130.000 <T	BDL		
METRIBUZIN (SENCOR) (NG/L)			DET'N LIMIT = 100	GUIDELINE = 80000 (A1)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	160.000 <T	BDL		
DEC	BDL	BDL		
METOLACHLOR (NG/L)			DET'N LIMIT = 500.	GUIDELINE = 50000 (A2)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	680.000 <T	BDL		
DEC	BDL	BDL		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
PHENOLICS (UG/L PHENOLICS)		DET'N LIMIT = .200	GUIDELINE = 2 (A4)
FEB	.600 <T	BDL	
APR	.600 <T	.400 <T	
JUN	BDL	BDL	
AUG	.600 <T	BDL	
OCT	.400 <T	.400 <T	
DEC	.600 <T	BDL	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED		
VOLATILES				
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
FEB	BDL	BDL		
APR	BDL	.050 <T		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	BDL		
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	BDL	.050 <T		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	.050 <T		
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
FEB	BDL	BDL		
APR	BDL	.100 <T		
JUN	BDL	.050 <T		
AUG	BDL	BDL		
OCT	BDL	.050 <T		
DEC	.050 <T	.100 <T		
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	BDL	.050 <T		
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
FEB	BDL	BDL		
APR	BDL	BDL		
JUN	BDL	BDL		
AUG	BDL	BDL		
OCT	BDL	BDL		
DEC	.100 <T	BDL		
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
FEB	BDL	30.200		
APR	BDL	28.300		
JUN	BDL	20.200		
AUG	BDL	12.800		
OCT	BDL	30.900		
DEC	BDL	25.200		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM MITCHELLS BAY WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM
	RAW	TREATED	
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)
FEB	BDL	BDL	
APR	BDL	BDL	
JUN	BDL	BDL	
AUG	.460	.140 <T	
OCT	BDL	BDL	
DEC	BDL	.040 <T	
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
FEB	BDL	14.050	
APR	BDL	15.700	
JUN	BDL	11.400	
AUG	BDL	9.350	
OCT	BDL	13.800	
DEC	BDL	14.100	
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
FEB	BDL	4.000	
APR	BDL	5.700	
JUN	BDL	4.700	
AUG	BDL	4.000	
OCT	BDL	3.400	
DEC	BDL	4.900	
BROMOFORM (UG/L)		DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)
FEB	BDL	.200 <T	
APR	BDL	.400 <T	
JUN	BDL	.400 <T	
AUG	BDL	.400 <T	
OCT	BDL	.200 <T	
DEC	BDL	.400 <T	
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
FEB	BDL	48.450	
APR	BDL	50.100	
JUN	BDL	36.750	
AUG	BDL	26.500	
OCT	BDL	48.250	
DEC	BDL	44.650	

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.